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SOCIETY OF
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SOCIETY OF MOTION PICTURE ENGINEERS

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SOCIETY OF MOTION PICTURE ENGINEERS

Membership in the Society of Motion Picture Engineers is a marked distinction. Applications for membership are by invitation and endorsement. All checks should be made payable to the Society of Motion Picture Engineers.

All receipts are expended directly to promote the objects of the Society and the interests of its members. There are no salaries or emoluments of any kind.

The following are extracts from the By-Laws:

The objects of the Society are: The advancement in the theory and practice of motion picture engineering and the allied arts and sciences, the standardization of the mechanisms and practices employed therein, and the maintenance of a high professional standing among its members.

An Active Member is one who is actually engaged in designing, developing or manufacturing materials, mechanisms or processes used in this or allied arts; and an Associate Member is one who, though not eligible to membership in the active class, is interested directly in the art.

Any person of good character may be a member in any or all classes to which he is eligible.

Prospective members shall be proposed in writing by at least two members in good standing, and may be elected only by the unanimous vote of the Board of Governors.

All applications for membership or transfers in class shall be made on blank forms provided for the purpose, and shall be accompanied by the required fee.

The entrance fee (for both Active and Associate Members) shall be twenty-five dollars ($25.00). The annual dues for Active Members shall be ten dollars ($10.00), payable in advance on July 1st of each year. The annual dues for Associate Members shall be five dollars ($5.00), payable in advance on July 1st of each year. That is, the total fee for the first year, which includes the entrance fees and first annual dues, is $35.00 for active members; and similarly $30.00 for associate members.

PRESIDENT'S ADDRESS

GENTLEMEN:

When in October this meeting was set for Atlantic City, I wondered who would come. I am gratified, therefore, to see so many of you here, for you represent the workers, those who can be depended upon to accomplish things.

For we have not come here two days in advance just to secure a grandstand seat for the Easter Sunday parade. We came to further our standardization in the motion picture industry, a standardization which we will continue from year to year, as our industry grows and takes on the welcome stability of approaching harvest time.

I think we may with profit and prophecy compare our industry to the sun flower, which from a tiny seed shoots up in the spring a tender green sprout which the browsing beast crops if left unwatched. But safely past this period of growth it begins to form a woody stalk able to stand alone against the autumn winds and hold aloft its golden crown.

Our industry is not quite past the stage where covetous eyes have ceased to watch for an opportunity to "bite us," but we are rapidly approaching that time when we will be able to resist stress by reason of the solidity of mature growth.

This is also the exact situation with regard to our Society. We will now quickly come to the maturing season, or we will die an ignominious death.

Solidity, the ability to stand alone, comes not so much in numbers as in individual strength—confidence in one's self. Not one single enduring movement was ever begun with numbers. Numbers alone count for very little. A mob easily forms, but just as quickly melts away. Permanency comes from individual confidence in the ultimate success of a fixed purpose.

Now the prime purpose of the organization of this Society was to standardize our industry. The way to standardize is to standardize. We will not accomplish it all this session, but without leaving this room there is plenty that can be done to wonderfully help the industry.

There are many looking to us to establish these standards. Most of those who have written me say they do not care so much what the standards are, being ready to accept any standard so far as they can be assured that it is the consensus of opinion of the engineers of this Society. In fact, they are anxious to do so as they have no other authoritative body to consult.

So let's get busy now and tabulate the majority opinion of our members on the several subjects to come up for consideration at this session.

Gentlemen, the meeting is yours.

C. FRANCIS JENKINS.

MOTION PICTURE CAMERAS

CARL LOUIS GREGORY, F. R. P. S.

The rapid growth of the motion picture industry has made it a difficult problem for manufacturers of motion picture apparatus to keep pace with the growing demands of the industry. The manufacturing problems have paralleled in many respects those of the automobile industry, but have by no means kept pace with them. It was only with the standardization of parts, and with the adoption of a standard method of measurements and specifications, that the automobile industry was able to reach the development that it has today. The American Society of Automobile Engineers was probably the largest factor in bringing about the standards in use in the automobile industry. It has, every year since its formation, helped in the elimination of freak designs and in rendering obsolete the unnecessary duplication of parts in odd sizes. The old idea of a manufacturer who would compel a customer to replace every part of a car from parts manufactured in that particular factory by making as many of the parts as possible of a different size from that of any other manufacturer is one which has never met with the approval of the consumer. If a car owner wished to use a different spark plug or piston ring than that supplied by the manufacturer of his car it didn't improve his state of mind to find that no other make of spark plug or piston ring would fit. No manufacturer ever benefited by this selfish attitude, for as soon as he had turned out enough of his odd sizes to make a market every other accessories maker turned to and made an odd size to fit it. This duplication of parts entailed more machinery, higher costs and, consequently, bigger prices for the consumer to pay.

Although it would seem at first inspection that the fact that the size of the film is practically an international standard and would, therefore, militate against an undue multiplication of parts in the film business, still we find on closer inspection that affairs are as bad or worse than they were at one time in the manufacture of gasoline vehicles. It is to be hoped that the Society of Motion Picture Engineers may do the same service for the motion picture industry that the American Society of Automobile Engineers is doing for the automobile industry.

One of the first things to put in order out of the chaos of filmdom is a comprehensive and comprehensible list of specifications by which a camera may be described. No manufacturer of automobiles would think of issuing a catalogue describing his car without including a full and detailed list of specifications. Yet none of the camera manufacturers have seemed to think this necessary in the catalogues describing their cameras. They often elaborate to great extent on some one feature or another, but slide gracefully out

of describing some of the essentials which they have left out of the catalogue, and generally left out of the camera also.

The camera is the keystone in the arch of picturedom. Without the camera the whole structure must fall to the ground. It is therefore of the utmost importance that the first attention of this august body be directed to the vital centre upon which every other section of the industry depends.

The average camera of the industry today is a marvel of compromise. It is expected to take the film of any maker, of any thickness and any degree of pliability, with perforations of any shape and almost any number per foot and produce a rock-steady picture. I say it is a marvel for it generally accepts all these handicaps and turns out pictures which look surprisingly good upon the screen.

It must accept all of the imperfections which a lack of standards subjects it to and turn out a picture degraded with an average of these imperfections.

Its sprocket teeth cannot fit the perforations for they must be made small enough to enter the smallest perforation that it may encounter. It must rely for registrations upon pressure plates with spring tension-pilot pins or guides being of little use unless a standard size of film and perforation be arbitrarily adopted for that particular camera. Thanks to the individual efforts of one or two of the members of this society, much excellent work in this line has been accomplished, but unless standards are universally adopted and used the standards of one clique are sure to clash somewhere with those of another clique and the war goes merrily on to the detriment of the industry as a whole.

It is high time that the essential parts and features of cameras have a universally recognized standard to which they should conform.

The first and most important standard to be determined is the frame line in its relation to the perforations. No two cameras can be used in the same production at the present time without having their frame lines adjusted to one another. The claws or fingers which engage the film for drawing down the succeeding frames are placed, in most cameras, at some distance below the frame opening and although two cameras with claws at different distances between their claw movement be adjusted according to one standard for their frame line, the use of a different standard of perforation, although the new standard be used in both cameras, will cause the frame lines to differ.

The studios of today who are turning out the best grade of work have adopted a standard for their plant and, at great expense, have made all of their cameras, perforators, printers, etc., conform to an arbitrary measure for their own protection. The companies who have recognized this great economic factor in production are unhappily still in the minority. It is not to be wondered at that in the absence of recognized standards that many makers have either never given the subject proper attention or felt equal to backing the various opinions of the others and trying to draw them into line.

An instance will illustrate the point which I am trying to bring out. One of the largest distributing combinations in the country shortly after their organization decided to run a trailer with their trade mark on all of their reels. They made an appropriation of stupendous proportions to bring this trade mark before the public by a national advertising campaign in magazines, newspapers and billboard space. I was assigned the task of making the negative for the trailer, pieces of which were sent to each company releasing through this organization. I made the negative with the frame line conforming to the standard of the principal member. It took nearly four months to bring this trailer into use among the different releasing companies, during which time it was necessary to remake an exact duplicate for each and every releasing company with a different frame line, and one company was even so sadly mixed that it required a frame line change to correspond to each camera that it owned, they were not able to put two camera men on the same job as their frame lines did not correspond.

A large number of camera men at the present time own their own outfits. This measure was adopted by them in the beginning as a measure of self-protection against the junk-boxes with which the manufacturers expected them to work.

As soon as the manufacturers found that the camera men would buy their own cameras many of them ceased providing cameras and depended altogether upon the heterogeneous collection of outfits that their camera men provided.

This situation is absurd—can you imagine a serious manufacturer of automobiles or machinery who would expect a workman to come into his factory with an arbitrary set of limit gauges and expect to assemble a product made by this workman with the product of other workmen when their measurement standards had never been compared?

That, gentlemen, is exactly the situation in a number of studios today where they are spending into the millions of dollars each year for the production of feature pictures de luxe.

You are all well aware that I might go on with an almost interminable list of evils that are crying out for extermination at your hands but I would be taking up time which would be better spent by you in devising remedies that are so sorely needed.

Fellow members, upon your decisions at this and coming meetings rest the savings of untold amounts of unnecessary waste in time, money and material.

REPORT OF COMMITTEE ON ELECTRICAL DEVICES

MR. HARVEY M. WIBLE, Chairman
MR. MAX MAYER
MR. W. G. KUNZMANN
MR. H. A. CAMPE

INTRODUCTION

1. Advantages and disadvantages of alternating current; How objections may be overcome.
   (a) Advantages.
   (b) Disadvantages.
2. Advantages and disadvantages of direct current; How objections may be overcome.
   (a) Advantages.
   (b) Disadvantages.
3. Various methods of changing from alternating to direct current when alternating current is available and direct current is desired.
   (a) Mercury Arc Rectifiers.
   (b) Motor Generator.
   (c) Rotary Converter.
   (d) Mechanical Rectifier.
4. Various apparatus for obtaining proper arc voltage when alternating current is to be used.
   (a) Choke Coil or Reactance.
   (b) Auto Transformer.
   (c) Rheostat.
5. Determination of proper arc voltage for both direct current and alternating current at various currents.
6. Relation to alternating current of frequency flicker and its synchronization with the shutter.
7. Nature, size and structure of carbons required for both alternating and direct currents for various currents.
8. Proper angle of carbons for alternating current and direct current.
9. Maximum density of current at carbon points in order to obtain maximum efficiency.

In the early days of the motion picture industry, the source of light was, in many instances, of the well known calcium type. Artificial gas, such as acetylene was also used, but as the public became interested in this new form of entertainment and education, the demand for a better form of illuminant necessitated discarding these sources of light. This was due to the increased size of the picture theatres and the demand for larger and better illuminated or more distinct pictures. It was for these reasons, primarily, that the electric arc was adopted for motion picture work.

The electric arc is particularly well adapted to this service as it is one of the most intensely brilliant artificial illuminants known to science. The major portion of the light produced, however, is not obtained directly from the arc, but from the incandescent tips of the carbon electrodes. The brilliant illumination of the film is secured by the condenser lenses which collect a portion of the light produced and converge it through the aperture plate, the illuminated area being generally known as the "spot." It is obvious, therefore, that if the spot is to be uniformly bright over its entire area the source of light must be concentrated in a fixed and as small a point as possible.

1. (a) The earliest current supply used for an electric arc for a light source for projection work was alternating, due to the fact that alternating current is more widely distributed and therefore, more readily available, and also because control apparatus for alternating current was simpler, more easily designed and less expensive. It is practically impossible to find direct current mains everywhere, except in the centers of some of the large cities, while alternating current is available at practically all places where there is a sufficient number of people to warrant the establishment of motion picture houses. The apparatus for the control of alternating current for an alternating current arc is simple, comparatively inexpensive, and on the market in a variety of forms readily available for practically any current throughout the range of application. The advantage of alternating current from a carbon standpoint lies only in the efficiency of the supply to the arc. By means of a transformer, reactance, etc., the line voltage can be very readily reduced to any value required by the arc with very little loss of power.

1. (b) That the arc produced by alternating current is not so satisfactory as the arc produced by direct current is quite generally recognized. This fact is due to a number of physical characteristics of the alternating current arc. (1) Both electrodes are heated almost uniformly, producing practically equal illumination. However, only the incandescent tip of one carbon can be located at the proper focal point for the condenser lenses. (2)The average temperature of the crater is comparatively low on account of the rapid transfer of this crater from one carbon end to the other. (3) If an improper revolving shutter is employed or if a satisfactory shutter is operated at other than correct speed, the pictures will have an undesirable flicker, due to the fact that the value of the alternating current is zero twice

each cycle of 120 times for a 60 cycle circuit. (4) The alternating current arc has a greater tendency to travel around the ends of the electrodes, which constantly shifts the incandescent area of the carbon tips, thus producing "ghosts" on the screen. (5) The light produced by alternating current has a preponderance of the violet end of the light spectrum, which is not so desirable as the yellow, from an optical point of view. (6) The cost of power for the alternating current arc is high, because the current required to produce a given illumination is about three times greater than the direct current required. From a carbon point, the disadvantage is chiefly in operation. The very highest grade, and therefore costly, carbons are required. The very short arc required for satisfactory operation means constant attention on the part of the operator. Further, the high currents necessary to get the degree of illumination now considered desirable, renders such an arc very noisy, which in itself is a hardship on the operator.

2. (a) The advantages of the direct current arc can be briefly stated as being converses of the disadvantages which have been cited for the alternating current arc. Careful experiments have demonstrated that the light resulting from a direct current arc is produced by the crater on the positive carbon, by the incandescent tip of the negative carbon, and by the arc stream proper, in the proportions of 85 per cent., 10 per cent. and 5 per cent., respectively. The crater is of comparatively small area and can therefore be located at the proper focal point of the condenser lenses. This explains the fundamental advantages of the direct current arc. The ease of operation, requiring little attention from the operator and the inherent stability and good operation of the direct current arc over wide range of arc voltages, makes this form of current ideal. Very high arc wattages can be made use of on direct current to obtain the illumination essential for very large pictures, but which would hardly be feasible to attempt with alternating current, so that in the field of projection in the large picture houses, direct current is supreme.

2. (b) The disadvantage of using direct current is primarily in the cost of converting appliances to change from alternating current to direct current, or if operating directly from 110 volts direct current, the entire line voltage enters into the cost consideration, since whatever energy is not used in the arc must be dissipated in resistance.

3. (a) If an alternating current supply system only is available and direct current is desired for the projecting machines, it is necessary to install equipment which will rectify or convert the alternating current to direct current. There are numerous types of equipment available for this survice, such as Mercury Arc Rectifier, Motor Generator Sets (of which there are two classes, namely, constant potential and constant current), Rotary Converters and Mechanical Rectifiers. When any one of the various types of converting equipments is used, with the exception of the Mercury Arc Rectifier, it is advisable to provide for "break down" service, so

that if the auxiliary equipment is disabled, the projectors may be operated temporarily with alternating current.

4. When alternating current only is available, and is to be used, the apparatus for obtaining the proper arc voltage may consist of a choke coil, reactance, transformer or rheostat. The transformers ordinarily used are of the single winding or auto type designed with sufficient reactance to stabilize the arc. A standard double winding transformer having suitable voltage characteristics could be used, providing a suitable reactance coil is connected in series with the arc. Rheostats should not be considered on account of their extremely low efficiency.

5. On Alternating Current a very short arc must be maintained; we cannot deviate from this operating condition. The arc voltage is, therefore, settled for the operator and usually is between 33 and 39 arc volts; that is, at a very short arc just after feeding, the voltage may be 33 and as the arc length increased with the burning of the carbon, the arc voltage will increase to a value of about 39 volts, if the arc is permitted to get any longer we find an immediate irregularity and unsteadiness in the arc. It will be found in practice that an Alternating Current will require feeding every 75 seconds. On Direct Current we have an inherently steady arc; that is, inherently steady as compared with an Alternating Current. The range of arc length and arc voltage can be made whatever the operator desires within certain limits, but there is one fact to be borne in mind, and that is, that for each given current value there is a definite arc length and arc voltage at which we have the most efficient operation. This can be determined in the following manner: Set the Carbons for a constant current, then shorten the arc length gradually and you will finally produce an unstable, noisy arc. Just previous to that point is the minimum limiting arc length for that given current and given carbons. Likewise, take a given arc length and increase the current until a noisy and unstable arc forms, then decrease the current a trifle and you will have the condition of maximum efficiency for that arc length. Because of the fact that a given arc length can only accommodate a certain maximum amount of current, it can readily be seen that we must increase the arc length each time we increase the current. Arc length is of course synonymous with arc voltage, so wherever we have mentioned increasing arc length we can say increasing arc voltage. So making this change in nomenclature we can make the statement that increasing current values in an arc requires an increased arc length and voltage. In actual practice it is found that there is some variation in the arc voltage for a given current with the make of the carbons and the combinations used, so that the voltages which we have listed are averages which are built up on the principles given above.

For direct current combinations using the ordinary positive carbons as indicated in the table and matching them up with plain negatives "Group A" we have a table of voltages as indicated in the following table marked "Group A" Negative Voltages:

Amps.	Group A Negatives Arc Voltage	Group B Negatives Voltage
30	52	52
40	55	54
50	58	56
60	61	58
70	64	60
80	67	62
90	68	64
100	69	66

In the above table, the table of voltages given for the combinations in which the positives are matched up with small negatives of "Group B" it will be noticed that these voltages are somewhat less. It has been found in actual practice that a well shaped crater can be obtained at these lower voltages with negative carbons of diameters which are one-half that of the positive. The usual size negative is approximately two-thirds the diameter of the positive. These special small negatives are metal clad in order to give them carrying capacity and life since they are operated at current densities far beyond their possibilities were they not metal clad.

6. The electric arc when operating on Alternating Current is known to possess the peculiarity of varying in intensity to a marked degree with the peak and zero points of the alternations; being clearly visible to the eye on frequencies under 40 Cycles.

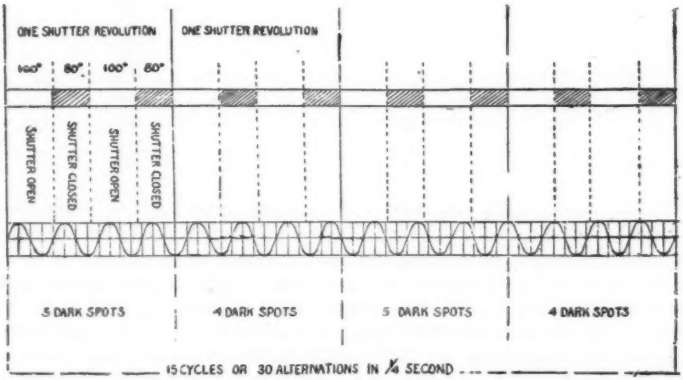
At commercial frequencies higher than 40 Cycles, this may be visibly demonstrated by moving under the arc a light colored pencil, or other object, against a dark background. When moved rapidly under direct sunlight or direct current arc, the pencil would naturally appear blurred, owing to the rapid change of position. Under the alternating current arc, the rapidly moving pencil would seem to be a number of pencils, each one clearly visible, with dark intermediate spaces. This is precisely the same effect as is obtained by moving the pencil in the light beam of a projector with the shutter revolving.

In reality, we are therefore dealing with two intermittent periods in the light source, when operating a film projector with an alternating current arc; namely, the light interruption of the shutter and the rise and fall of the light intensity of the arc. The former depends for its frequency upon the speed of rotation of the shutter and the number of wings therein; while the latter depends upon the frequency of the current.

In determining the relation between current frequency and shutter movement, we might for example imagine a shutter with three 60-degree openings and revolving at 40 revolutions per second.

This would give us 120 dark spots per second. An arc lamp on 60 cycle current would also have 120 dark spots per second. It is therefore evident that under these conditions, if the shutter opening occurred at the same instant at the zero point of the cycle, practically

no light would be obtainable on the screen; as the shutter wings would block out the light each time it occurred.



If now the shutter be moved 60 degrees on its shaft, the maximum light would be obtained, as then the shutter openings would register with the peaks of the current alternations. These conditions, of course, would prevail only if the shutter and current were perfectly synchronized. If the speed of the shutter were reduced to 20 revolutions per second, 4 peaks at each opening.

While the 60 cycle current prevails in practice the aforementioned speed and shutter openings do not; consequently, at the normal shutter speed of 16 revolutions per second, the shutter openings would be out of step with the current frequency, with the result that some of the shutter openings would receive one, some two and some three impulses of light, causing a visible variation of light on the screen.

Since each projected image is illuminated for a time period equal to the sum of all the shutter openings during one revolution, the light impinged on each image would be the same if the light source were constant. With the alternating current arc, the light would vary with the number of peaks to each respective image, the variation and resulting flicker depending upon actual difference in frequency of shutter flicker, or in other words, depending on how much they are out of step.

The following diagrams show these variations under the normal conditions of a projection speed of 16 images per second, with a 60 cycle arc, and using a commercial shutter of two 80-degree wings with two 100-degree openings.

It is obvious from the above that a current flicker can be avoided in alternating arc projection, only by occasional accidental synchronizing for short periods of time, or by a carefully planned synchronization, together with special shutter design.

It is evident that current flicker is an inherent objection to alternating current arc projection. There are other faults better known, such as the bluish color of the light, the poor concentration of light at the light source focus of condensor, and the noisy hum of the arc.

Without entering into details of these other objections, which are apart from the subject matter of this paper, the mention of them seems permissible, as it completes the evidence against alternating current projection, and proves its use poor practice.

Since the direct current arc possesses none of these objections and since a large variety of thoroughly satisfactory and practical apparatus is on the market for converting alternating current to direct current, there seems to be no excuse for faulty projection, resulting from the use of alternating current.

For alternating current, cored carbons in both upper and lower are always used and these are the same size. This is essential, of course, since the rate of consumption is practically the same for both the upper and lower carbon. On direct current some operators use cored carbons, both upper and lower, and also use the same size carbon for the positive as well as the negative.

While it is sometimes desirable to use cored carbons, both positive and negative, it is the wrong principle to use the same size—the negative carbon should always be smaller than the positive.

For all around service the most advisable ratios will be such that the cross section of the positive carbon would be twice that of the negative carbon, but in actual practice we find that a negative carbon would not have the carrying capacity for the current required for the positive, if the latter were operated at maximum current density. Therefore, the following combinations are a compromise which have been standardized for various current densities. These are as follows:

MAXIMUM CURRENT.

Size	Alternating Current	Direct Current	Plain Negatives Direct Current	Metal Coated Neg. Dir. Cur.
1″	100	85-100	3/4 Cored or sol.	3/8 sol. spec. coated
7/8″	90	65-85	3/4 " " "	3/8 " reg. "
3/4″	75	50-65	5/8 " " "	11/32 " " "
5/8″	60	50	1/2 " " "	5/16 " " "
9/16″	50	40		
1/2″	40	35		
7/16″	25	25		
3/8″	15	15		
5/16″	10	10		
7 m m	8	8		
6 m m	6	6		

In the table of direct current capacities, from the 5/8″ size up, the next smallest sized solid carbon is used as the negative.

Cored negative carbons give steadiness at the cost of the candle power of the arc. Under certain conditions it is possible to operate carbons at somewhat higher current densities than here given and still obtain satisfactory service. It is, however, essential, in order to

operate at these higher current densities, that special small diameter metal coated negative carbons be used, the reason being as already mentioned that such combinations can be operated at high current densities, with short and steady arcs free from noise, whereas for the same current density and the use of ordinary negatives, the arcs would be unsteady.

8. Since the light from the direct current arc is emitted from the crater of the positive carbon, it is desirable that the carbon be tilted at such an angle as to point the crater directly at the lens, and still prevent the lower carbon from cutting off the light. An angle of about 25 degrees has become standard for this service. With an alternating current arc the light is given by both carbons, which means that it is desirable to use the carbons more nearly vertical. A slight angle is, however, necessary in order to make draft conditions correct.

9. With Alternating current the carrying capacity is limited by the ability of the carbon to carry the current, whereas on direct current, it is limited by the ability of the crater to stand up under high current densities; that is, the 5/8" carbon can carry 60 amperes alternating current without undue heating, but on direct current 50 amperes would be the limit, since a higher current value would tend to break down the crater formation with subsequent unsteady operation.

MOTION PICTURE NOMENCLATURE

ADOPTED IN COMMITTEE OF
THE WHOLE SOCIETY

cine—A prefix used in description of the motion picture art or apparatus.

condensers—In an optical projection mechanism, the lens combination which gathers the diverging rays of the luminant and converges them into the objective.

douser—The manually operated door in the projecting machine which intercepts the light before it reaches the film.

frame (noun)—A single picture of the series of a motion picture film.

frame (verb)—The adjustment of the relative position between the aperture and the pictures on the film to bring them into register with each other.

intermittent sprocket—The sprocket (in motion picture apparatus) which engages the film to give it intermittent movement at the light aperture.

lantern picture—A still picture projected on a screen by means of an optical lantern.

lantern slide—The transparent picture from which a lantern picture is projected.

magazine valve—The film opening in the magazine of a motion picture projector.

motion picture—The synthesis of a series of related picture elements, usually of an object in motion.

motion picture film—The ribbon upon which the series of pictures are recorded.

motion picture projector—An optical lantern equipped with mechanisms for suitably moving motion picture film across the projected light.

negative stock—Light sensitive film intended for motion picture camera use.

negative—The developed film, after being exposed in a camera.

objective—The image-forming member of the optical system in picture apparatus.

positive stock—The light, sensitive film intended to be printed upon through a negative.

positive—The developed film, after being printed through a negative.

print—Same as **"positive."**

projecting lens—The lens (in an optical machine) which images the picture on the screen.

reel—The flanged spool upon which film is wound for use in projecting machines.

reel—An arbitrary unit of measure for film—approximately a thousand feet of length.

rewind—The process of reversing the winding of a film, usually so that the end to be first projected shall lie on the outside of the roll.

rewinder—The mechanism by which rewinding is accomplished.

safety shutter (also known as the fire-shutter)—The automatically operated door (in a projecting machine) which intercepts the light when the machine runs below normal speed.

screen—The surface upon which a picture is optically projected.

shutter—The obscuring device, usually a segmental revolving disc, employed to intercept the light during the movement of the film in motion picture apparatus.

shutter—working blade (also known as the cutting blade or obscuring blade)—That segment which intercepts the light during the movement of the film at the picture aperture.

shutter—intercepting blade (also known as the flicker blade)—That segment which intercepts the light one or more times during the rest or projection period of the film.

sprocket—The revolvable toothed member (in motion picture mechanisms) which engages the perforations in the film.

take-up (verb)—The process of winding the film (in a motion picture machine) after it passes the picture aperture.

take-up (noun)—The mechanism which receives and winds the film (in a motion picture machine) after it passes the picture aperture.

throw—The distance to the screen from the objective of a lantern or a motion picture projecting machine.

still—A picture printed from a single negative.